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Smoking change of English-, French-, and Chinese speaking immigrants in Ottawa and Gatineau, Canada

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Abstract

Background: Immigrant smoking change is of particular interest to multicultural health researchers and policymakers.

Objective: To examine the smoking change of the English-, French-, and Chinese-speaking immigrants in Ottawa and Gatineau, Canada, and identify the demographic factors that correlate with the change and impact the change.

Materials and Methods: In total, 810 immigrants of the three language subgroups were recruited by purposive-sampling method. Using self-reports, the participants answered questions regarding smoking change and demography in multi-cultural lifestyle change questionnaire of English, French, or Chinese version. Percentage, significance, and multivariate (correlation and regression) analysis methods were used in data analysis for the different subgroups.

Result: Immigrants of different gender, language, and category subgroups exhibited values for different smoking rates, smoking rates before and after immigration, smoking change rates, and smoking belief change rates but no statistical difference between the rates. Smoking change (smoking behavior change + smoking belief change) correlated positively with age and duration of residence in Canada and negatively with gender and category of immigration. Smoking behavior change correlated positively with age and duration of residence in Canada and negatively with mother tongue and gender. Age and gender significantly impacted smoking change (smoking behavior change and smoking belief change). The duration of residence in Canada significantly impacted smoking belief change.

Conclusion: The immigrants in Canada experienced different smoking changes. Age, gender, and duration of residence were the main impacting factors. Culture and acculturation were the relating contributing factors. Data of immigrant smoking change may provide an evidence for smoking control policymaking and policy-revising in Canada.

KEY WORDS: Immigration, culture, acculturation, smoking change, impacting factors

Introduction

Smoking is one of the major modifiable health-related lifestyle risk factors.^[1-4] Addiction to tobacco has been identified as the largest single factor of ill-health and premature

death in Canada.^[5] Early immigration can lead to a number of Canadian immigrant groups to exhibit significantly lower rates of daily smoking.^[6] Especially, non-European immigrants were less likely than other Canadian people to become daily smokers.^[7] Immigrant youth in Canada were less likely to engage in tobacco use, because they were less probably to affiliate with peers who smoke and more likely to come from families where parents do not smoke.^[8] For example, a cigarette smoking survey of high school students in Toronto displays that there was no apparent increase in smoking rates for immigrants after 2 or more years in Canada.^[9] Similarly, it has been observed that cigarette smoking of Canadian immigrant women did not change with the extension of the time they resided in Canada.^[10] Furthermore, a survey in

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the US revealed that Asian/Pacific immigrants exhibited significantly lower smoking prevalence rates than nonimmigrants, but the rates varied according to country of birth.^[11] In contrast, another study showed that the incidence of smoking among immigrants increased with the length of residence in Canada.^[12] Most of the studies examining smoking among immigrant communities have been guided by the framework of “acculturation,” which is typically defined as “the process by which foreign-born individuals adopt the values, customs, norms, attitudes, and behaviors of the mainstream culture.”^[13,14] However, less is known whether the difference in smoking behavior change and smoking belief change varies across different cultural immigrant groups or subgroups.

English-speaking immigrants represent one of the largest ethnic or cultural immigrant subgroups in Canada and are the largest immigrant subgroups in the Ottawa (Ontario)–Gatineau (Québec) region,^[15,16] while French-speaking immigrants are one of the principal ethnic immigrant groups in Québec and the second largest immigrant subgroup in the region.^[15–17] Chinese-speaking Canadians have constituted the largest ethnic immigrant subgroup entering Canada, one of the fastest-growing subgroups in Canada since 1987 and the fourth largest subgroup being Arabic-speaking immigrants in the Ottawa–Gatineau region.^[16,18,19]

The main objectives of this study were to explore the differences in smoking change among different immigrant subgroups and to explore the correlation and relationship between smoking-dependent variables (smoking behavior change and smoking belief change) and demographic-independent variables (mother tongue, age, gender, category of immigration, duration of residence in Canada, etc.). The explorations show far-reaching significance in multicultural health research, health care, health policymaking, and health-promoting program in Canada.

Materials and Methods

English, French, and Chinese immigrants at Adult Educational Centers/schools, Christian community churches, and communities in Gatineau and Ottawa of Canada were identified as the target population of this multicultural cross-sectional study. Random sampling was deemed impracticable for the study and could bring greater bias, because immigrant status of the three ethnic subgroups could not be identified effectively according to the sampling criteria. Purposive-sampling method was applied in the multicultural study to recruit qualified immigrant participants.^[20,21]

Immigrants of the first generation in Ottawa and Gatineau were defined as the participants in the multicultural study, who must have been aged 18 years or older, resided in Ottawa or Gatineau for ≥ 1 year, and aged 16 years or older when they arrived in Canada, for controlling confounders of the immigrant smoking change study as far as possible. In total, 810 qualified English-, French-, and Chinese-speaking immigrant participants were recruited to the study. All the

participants answered questions relating to smoking and demography in a multicultural lifestyle change questionnaire of English, French, or Chinese version developed by the authors, with all responses self-reported. The multicultural lifestyle change questionnaire was demonstrated by a pilot test in the three immigrant subgroups to have high validity (Pearson correlation coefficient $r = 0.435 >$ satisfactory value 0.40)^[22,23] and reliability (alpha coefficient $\alpha = 0.754 >$ satisfactory value 0.70) before the multicultural study.^[24,25]

Smoking subjects were defined as the sum total of smoking subjects before immigration, after immigration, and both before and after immigration.

Smoking change included smoking behavior change and smoking belief change (dependent variables). Smoking behavior change was identified based on the response choice of the smoking question in the multicultural lifestyle change questionnaire—“Which of the following best describes you?” The options of this question were “A. You have never smoked cigarettes,” “B. You smoked before arrival in Canada, but quit after arrival,” “C. You did not smoke before arrival in Canada, but began to smoke after arrival,” “D. If you smoked both before arrival and since arrival in Canada, go to questions below the section on smoking quantity.” The respondent was identified experiencing smoking behavior change if they chose options “B” or “C.”

Smoking quantity was identified according to the response choices of two questions of smoking quantity in the questionnaire—“In the last year before arrival in Canada, on average, how many cigarettes did you smoke each day?” (question 1) and “In the past year in Canada, on average, how many cigarettes did you smoke each day?” (question 2). The response options for both questions were as follows: “a. 1–10 (less than one pack),” “b. 11–20 (one pack),” “c. 21–40 (two packs),” “d. 41 or more (more than two packs),” and “e. Do not know.” The respondent was also identified experiencing smoking behavior change if there were different choices in the options of two questions except option “e” (i.e., picking option “a” for question 1 and choosing option “b” for question 2).

Smoking belief change was identified based on the response choices of two smoking belief questions in the questionnaire—“Before arrival in Canada, which of these statements best describes your belief with regard to smoking cigarettes?” (question 1) and “Since arrival in Canada, which of these statements best describes your belief with regards to smoking cigarettes?” (question 2). The response options for both the questions were as follows: “A. Smoking cigarettes is *extremely bad* for health,” “B. Smoking cigarettes of alcohol is *very bad* for health,” “C. Smoking cigarettes of alcohol is *bad* for health,” “D. Smoking cigarettes is *somewhat bad* for health,” “E. Smoking cigarettes is *less than somewhat bad* for health,” “F. Smoking cigarettes is *not bad* for health,” and “G. Do not know.” The respondent was identified experiencing smoking belief change if there were different choices in the options of two questions except option “G” (i.e., picking option “A” for question 1 and choosing option “B” for question 2).

Immigrant status of English-, French-, or Chinese-speaking subjects was identified by their response to “original country” question in the questionnaire—“What is your country of origin?”

Demographic characteristics (independent variables) of the study population were identified according to the response choice of the demographic questions relating to “mother tongue,” “speaking language,” “age,” “gender,” “marital status,” “category of immigration,” “duration of residence,” “education,” “employed status,” “occupation,” “religion,” and “income” in the questionnaire.

The data in smoking and demography were analyzed statistically for the different immigrant subgroups.

Statistical Analysis

The various rates in smoking were calculated, which included smoking rate, smoking rate before and after immigration, smoking change rate, smoking belief change rate in the total sampled immigrant subjects, the gender (man and woman) subgroups, the language (English-, French-, and Chinese-speaking) subgroups, and the category (principal applicant immigrant, spouse and dependant immigrant, family class immigrant, other/refugee immigrant) subgroups.

The χ^2 -tests were performed to test if there were significant differences between the rates of immigrant gender subgroups, language subgroups, and category subgroups in smoking.

Following the descriptive analysis, a correlation analysis was performed to test if there were correlations between demographic (independent) variables—mother tongue, age, gender, category of immigration, duration of residence in Canada, etc., and smoking (dependent) variables—smoking change (smoking behavior change + smoking belief change)

and smoking behavior change. The objectives were to measure the correlation between the independent variables and dependent variables. Finally, multiple linear regression analysis was used to determine the overall relationship between these variables or to test if the independent variables had significantly impacted the dependent variables. SPSS software, version 22, was used in data analysis.

Ethical Approval

The immigrant smoking change study was part of a multi-cultural lifestyle change research project that was approved by the Social and Behavioral Research Ethics Committee, Flinders University, Australia, in 2010, and by Office of Research Ethics and Integrity, University of Ottawa, Canada, in 2014.

Result

Rates in Smoking

The rates in smoking were calculated as: smoking rate = smoking subjects before immigration + smoking subjects after immigration + smoking subjects both before immigration and after immigration/sampled subjects \times 100%; smoking rate before immigration = smoking subjects before immigration/sampled subjects \times 100%; smoking rate after immigration = smoking subjects after immigration/sampled subjects \times 100%; smoking change rate = smoking subjects before immigration + subject number of increasing or decreasing cigarette consumption after immigration/sampled subjects \times 100%; smoking belief change rate = subjects of smoking belief change after immigration/sampled subjects \times 100%.

Table 1 presents the rates in smoking by population subgroups.

Table 1: Rates of total sample and different subgroups in smoking

Item	Smoking				
	Smoking rate (%)	Smoking rate before immigration (%)	Smoking rate after immigration (%)	Smoking behavior change rate (%)	Smoking belief change rate (%)
Total sample (810)	46.05	33.58	36.30	29.14	44.94
Gender subgroups					
Immigrant men (411)	59.61	43.80	48.91	36.01	51.58
Immigrant women (399)	32.08	23.06	23.31	22.06	38.10
Language subgroups					
English immigrants (278)	54.32	26.98	48.92	29.86	46.40
French immigrants (268)	36.94	27.99	28.36	24.63	30.97
Chinese immigrants (264)	46.59	36.74	31.06	32.96	57.58
Category subgroups					
Principal applicant immigrants (193)	52.33	43.01	41.45	29.02	53.37
Spouse and dependant immigrants (193)	41.62	27.41	31.98	29.44	41.62
Family class immigrants (354)	44.35	30.79	34.46	28.81	45.20
Refugee immigrants (70)	47.14	37.14	41.43	28.57	27.14

Table 2: Significance level of rates in smoking

Item	χ^2	<i>p</i>	Significant difference
Rates in smoking in male and female immigrant subgroups	10.000	0.350	No
Rates in smoking in English-, French-, and Chinese-immigrant subgroups	30.000	0.363	No
Rates in smoking in principal applicant, spouse and dependent, family class, other/refugee immigrant subgroups	60.000	0.267	No

$p < 0.05$.

Table 3: Multivariate analysis of immigrant smoking change

Correlation analysis					Multiple linear regression analysis			
Dependent variable	Independent variable	Pearson's <i>r</i>	<i>p</i>	Correlation between independent and dependent variables	Dependent variable	Independent variable	<i>p</i>	Impact of independent variable on dependent variable
Smoking change (smoking behavior change + smoking belief change)	Age	0.155	0.000	Positive correlation	Smoking change (smoking behavior change + smoking belief change)	Age	0.001	Significant impact
	Duration of residence in Canada	0.186	0.000	Positive correlation		Gender	0.000	Significant impact
	Gender	-0.217	0.000	Negative correlation		Duration of residence in Canada	0.020	Significant impact
	Category of immigration	-0.089	0.011	Negative correlation				
Smoking behavior change	Age	0.121	0.001	Positive correlation	Smoking behavior change	Age	0.007	Significant impact
	Duration of residence in Canada	0.134	0.000	Positive correlation				
	Mother tongue	-0.114	0.001	Negative correlation		Gender	0.000	Significant impact
	Gender	-0.283	0.000	Negative correlation				

$p < 0.05$.

Significance Level

Table 2 presents the significance level of rates in smoking.

Multivariate Analysis: Correlation and Regression

Table 3 presents the multivariate analysis results in smoking.

Discussion

Rates in Smoking

Total Sample

The results in smoking show that the immigrants in Ottawa and Gatineau, Canada, showed a higher smoking rate (46.05%), smoking rate before immigration (33.58%), and smoking rate after immigration (36.30%). Smoking rate after immigration was higher than that before immigration.

Immigrant smokers increased after immigration. The rate of immigrants who experienced smoking behavior change was 29.14%. However, 44.94% of the immigrants changed smoking belief after immigration. It is worth to note that smoking belief change rate of the immigrants was higher than their smoking behavior change rate, which discloses that smoking belief change was not congruent with smoking behavior change. It seems that smoking behavior and smoking belief have different levels of acculturation.^[26] Acculturation has been broadly described as “the process by which immigrants adopt the attitudes, values, customs, beliefs, and behaviors of a new culture.”^[27,28] Acculturation is an indication of the cultural change of minority individuals to the majority culture.^[29] Smoking belief could have higher acculturation level than smoking behavior. Because of the difference of background culture, some of the immigrants could have higher acculturation levels of smoking behavior, and others could have higher

acculturation levels of smoking belief. Some of the immigrants who changed smoking belief did not change their smoking behavior.

Considering the data on smoking change study, smoking rate (46.05%) of the immigrants (age 18+ years) was higher than ever smoking rate (44%, ever smoker: current and former smoker combined) of Canada citizens (age 15+ years) in 2012 but lower than the smoking rate (51%) of Canada citizens (age 15+ years) in 1999. Similarly, their smoking rate (36.30%) after immigration was higher than the current smoking rate (106%) of Canada citizens in 2012 and the current smoking rate (25%) of Canada citizens in 1999.^[30] However, the results in smoking rate could not demonstrate that smoking rate of Canadian immigrants was higher than that of nonimmigrants, because of disparities of study time, study method, data collection sites, and data analysis methods.

It was known that smoking or smoking change was related to acculturation: higher acculturation was associated with a greater likelihood of recent smoking, and less acculturated individuals were more likely nonsmokers.^[31–33] For example, a study shows that acculturation might drive smoking change and the rate of tobacco use among immigrants might change as they become “more acculturated.”^[34] Nevertheless, other research findings reveal that acculturation did not significantly influence smoking status or smoking rate^[29] and tobacco cigarette smoking was inversely associated with the level of acculturation.^[31]

Gender Subgroups

The data in smoking reveal that different gender subgroups showed different rates in smoking. However, all of the rates (smoking rate, smoking rate before and after immigration, smoking change rate, smoking belief change rate) of male immigrants were higher than those of female immigrants. In particular, smoking rate after immigration of male immigrants was higher more than two times than that of female immigrants. According to smoking survey (aged 12 years and older) of Statistics Canada in 2011, male smokers (22.3%) in Canadian citizens were more than female smokers (17.5%).^[35] Male immigrants could face more challenging and psychological pressures after immigration. Thus, the male immigrants in Ottawa and Gatineau showed greater smoking behavior change and smoking belief change than the female immigrants.

It has been known that the effect of acculturation on smoking was not uniform and might even differ from men to women within the same immigrant population,^[34,36–38] because the association of acculturation and smoking was gender specific.^[39,40] Some of the studies reveal that smoking rates for all female immigrants were generally lower than those of male immigrants, because male immigrants showed higher level of smoking acculturation than female immigrants.^[18,34,41] However, a research finding in the United States exposed that less-accultured male and more-accultured female immigrants in south Asian immigrants were more likely to be smokers (i.e., Vietnamese, Cambodian, and Lao immigrants).^[42]

Moreover, another finding exhibited that increased smoking prevalence with increased acculturation was consistently observed among Hispanic women but not among men.^[39]

Language Subgroups

The data show that different language subgroups revealed different rates in smoking. Among the three language subgroups, English immigrants showed the highest smoking rate (53.32%) and smoking rate after immigration (48.92%) and the lower most smoking rate before immigration (26.98%), while Chinese immigrants showed the highest smoking rate before immigration (36.74%), smoking change rate (32.96%), and smoking belief change rate (57.58%). However, French immigrants showed the lower most smoking rate (36.94%), smoking rate after immigration (28.36%), smoking change rate (24.63%), and smoking belief change rate (30.97%). It appears that Chinese immigrants revealed the greatest smoking behavior change, while the English immigrants showed the second greatest change, and the French immigrants exhibited the least change. It has been known that smoking rate of Chinese immigrants decreased after immigration, but the smoking rate of the English and French immigrants increased. The smoking rate of English immigrants was higher than that of French immigrants. However, data of smoking survey in Canada in 1994 showed that smoking rate (35%) of Francophone (French-speaking) immigrants was higher than that (26%) of Anglophone (English-speaking) immigrants.^[20] Research findings show that tobacco use among foreign-born immigrants significantly varied by racial and ethnic backgrounds.^[35,43] For example, Puerto Rican and Cuban Latino immigrants were more likely to be current smokers and to smoke over 20 cigarettes per day than Latino immigrants of other origins in the United States, and Central American Latino immigrants showed the lowest smoking rates in the Latino immigrants.^[36]

On the other hand, language preference and English language proficiency may exhibit different smoking impacting effects on different linguistic or ethnic immigrant subgroups. For instance, smoking rate was significantly lower among Spanish-speaking Hispanics than among English-speaking Hispanics.^[44]

Meanwhile, the results reveal that Chinese immigrants exhibited the highest smoking belief change rate (57.58%) or the greatest smoking belief change, while English immigrants showed lower smoking belief change rate (46.40%) or less smoking belief change. However, French immigrants showed the lowermost smoking belief change rate (30.97%) or the least smoking belief change. Evidently, because of environmental change and acculturation, immigrants experienced smoking belief change, but different ethnic and cultural subgroups exhibited different changes.

A research finding exhibits that acculturation showed opposite effects on the same health behavior among different ethnic groups or subgroups.^[26] Thus, different linguistic immigrant subgroups could have different smoking change because of different effects of acculturation. It appears that

Chinese immigrants showed greater smoking change because they could have higher levels of smoking acculturation than English and French immigrants.

Category Subgroups

The study results reveal that different immigrant category subgroups showed different rates in smoking. Among the four category subgroups, principal applicant immigrants showed the highest smoking rate (52.33%), smoking rate before immigration (43.01%), smoking rate after immigration (41.45%) and smoking belief change rate (53.37%), while spouse and dependant immigrants showed the lowermost smoking rate (41.62%), smoking rate before immigration (27.41%) and smoking rate after immigration (31.98%), and the highest smoking change rate (29.44%). It is interesting to note that smoking rate (44.35%), smoking rate before immigration (30.79%), and smoking rate after immigration (34.46%) of family class immigrants were lower than those of principal applicant immigrants and other (refugee) immigrants and higher than those of spouse and dependent immigrants; however, their smoking change rate (28.81%) was slightly lower than that of spouse and dependant immigrants (29.44%) or principal applicant immigrants (29.02%) and higher slightly than that of other (refugee) immigrants (28.57%), and their smoking belief change rate (45.20%) was lower than that of principal applicant immigrants (53.37%) and higher than that of spouse and dependent immigrants (41.62%) or other (refugee) immigrants (27.14%). Other (refugee) Immigrants showed the lowermost smoking change rate (28.57%) and smoking belief change rate (27.14%).

Principal applicant immigrants decreased the consumption of cigarettes after immigration. On the contrary, immigrants of the other three subgroups increased their consumption of cigarettes after immigration.

It seems that the four category subgroups showed approximate smoking behavior change but presented quite different smoking belief change, which reveals that smoking behavior change of different category subgroups was not congruent with their smoking belief change.

It is inferred that immigrants of different category subgroups could have different level of smoking acculturation, which contributed the difference in smoking change, in particular, smoking belief change.

Significance Level

Although significance analysis results show that there was no significant difference between the rates of different immigrant subgroups in smoking, percentage comparisons indicate substantial differences between some of the rates in smoking.

Multivariate Analysis

The results of correlation analysis show that smoking change (smoking behavior change + smoking belief change) was correlated positively with age and duration of residence in Canada and negatively with gender and category of

immigration; smoking behavior change was correlated positively with age and duration of residence in Canada and negatively with gender and mother tongue. Age, gender, and duration of residence in Canada were correlated with both smoking behavior change and smoking belief change. The data of Statistics, Canada, discloses that the proportions of immigrants who were smokers generally increased with time in Canada.^[45] The category of Immigration was correlated with smoking belief change, because it was correlated with smoking change instead of smoking behavior change, which shows that immigrants of different category subgroups showed a greater difference of smoking belief change. However, mother tongue was correlated with smoking behavior change rather than smoking belief change, as it was not correlated with smoking change (smoking behavior change + smoking belief change), which displays that immigrants of different ethnic or language subgroups presented a greater difference of smoking behavior instead of smoking belief. A smoking survey reveals that cultural factors were principally related to smoking behavior.^[39]

Meanwhile, the results of regression analysis disclose that age, gender, and duration of residence in Canada significantly impacted smoking change (smoking behavior change + smoking belief change) and age and gender significantly impacted smoking behavior change. Age and gender were the main determinant factors of both immigrant smoking change and smoking behavior change. Nevertheless, the duration of residence significantly impacted smoking belief change and was a determinant factor of smoking belief change, because it significantly impacted smoking belief change rather than smoking behavior change, which exposed that smoking belief of immigrants experienced greater change with the increase of time in Canada. Apparently, smoking behavior of immigrants did not change accordingly with smoking belief. Some of immigrants changed smoking behavior but did not change smoking belief. They experienced smoking behavior change because of other factors instead of smoking belief change. Immigrants of different ethnic or lingual subgroups could show different smoking behavior change and smoking belief change. However, cultural and acculturated factors impacted more greatly the smoking behavior and smoking behavior change of immigrants and influenced less their smoking belief and smoking belief change. In addition, socioeconomic and environmental factors could influence smoking behavior change and smoking belief change at different degrees.

Policy Implication

The results of this smoking change study provide evidence for making and/or revising policies related to immigrant health in Canada, which may regulate or adjust health care and services for immigrants and make more effectively smoking control promotion programs to lessen the immigrant risk of diseases relating to smoking, health inequality, and inequity for immigrants. The data may help Health Canada policymakers to source and consider the evidence of smoking change for the vulnerable and marginalized populations in decision-making

and policy-revising process and to adapt appropriately evidence, before and during formulating new health policy or revising previous health policy. These will help more Canadian immigrants quit smoking and improve their health and experience healthier status in order to contribute to Canadian economic and social development.

Research Strengths and Limitations

The multicultural survey is a unique immigrant smoking change study, which discloses initiatively pre- and postdeparture smoking status of different immigrant subgroups, may fill partly gap of multicultural smoking research, and can contribute greatly and significantly in multicultural health research. However, the study was a retrospective self-reported or proxy-reported smoking change survey, and the degree to which some of the results could be inaccurate because of some of reporting errors were unknown. First, the sampled subjects were not large enough. Second, ideal random selection of immigrants or immigrant families was not used in the study sampling. Third, the multicultural survey only involved the immigrants of three language subgroups (English, French, and Chinese) and lacked immigrants of Spanish, Arabic, and other immigrant subgroups. Fourth, immigrant lifestyle changes were surveyed only in two cities of Canada instead of all the cities or the majority of cities. Finally, some of the potential biases and confounders could have occurred in the survey. Thus, the study represents limitedly immigrant smoking change and can lack indirect generalizability of smoking change.

Conclusion

The English-, French- and Chinese-speaking immigrants in Canada experienced smoking change. However, the immigrants of different gender, language, and category subgroups displayed different changes. Different factors contributed to the changes. Age and gender significantly impacted the smoking change (smoking behavior change and smoking belief change) of the immigrants. Duration of residence in Canada significantly impacted their smoking belief change. Culture and acculturation were the relating factors that contributed to smoking behavior change and smoking belief change of immigrants. Data of immigrant smoking change may provide the evidence for smoking control policymaking and policy-revising in Canada.

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